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PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improvements in Rotary Compressor Systems

I, THOMAS WINTER NICHOLS, of 23a, Devonshire Road, Bexhill-on-Sea, a British Subject, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to Rotary Compressor systems or sets primarily, but not exclusively, such as portable plant used in road construction, excavating and mining work, and generally form a self-contained plant or installation.

These installations usually comprise an oil engine or electric motor direct coupled to rotary compressors of the two stage type, an air receiver, to which the compressed air with the cooling, sealing and lubricating oil is delivered direct from the high pressure compressor. The oil and air separates within this receiver and the oil drops to the bottom of same or may be drained into a collecting tank from which it is taken by a pump and forced through an oil cooler for cooling on its way to the air compressors, whilst the air is passed through a filter to remove the oil mist which it carries before passing on to the tools to be operated, the oil operating on an enclosed circuit.

The object of this invention is to simplify these installations by using only a single stage rotary compressor of a preferred output as standard, instead of the usual two stage compressors, and when larger outputs are required I propose to arrange multiples of this compressor, say two, three, four or more of them around a power driven shaft so that a range of outputs is obtained to cover generally the demands of the markets.

In a small installation a single compressor would be driven direct from the engine or motor used but for larger outputs multiples of this compressor would be driven through a simple train of gears arranged around the power shaft. The diameters of these gears could be modified to alter the speed of the compressors so that intermediate outputs would be obtained as preferred. Varying the length of the rotor and the body would also vary the output obtained, so that a single set of manufacturing jigs would be all that is needed to manufacture the full range of compressors for the outputs generally required.

A further improvement is provided in the method used for cooling the sealing and lubricating oil used in the compressor or compressors. The mixed oil and air delivered from the compressor or compressors may be cooled together or the oil only after separation from the air in a multi-passage fan cooled radiator or cooler, as preferred. This multi-passage cooler may be of the gilled tubing type where the oil enters at the top and passes across from one side to the other several times on its way down to the outlet at the bottom.

When the air and oil are cooled together the mixture is delivered direct to the cooler from the compressor delivery outlet, and after passing through it, is delivered to the receiver where the oil drops to the bottom and is forced through tubing back to the compressor, for cooling and sealing, by the air pressure in the receiver acting upon it, whilst the air passes through a filter, to collect any oil mist, on its way to the tools to be operated.

When the oil only is cooled, the oil and air are delivered together direct into the receiver where they separate, the oil falling to the bottom of same and the air pressure acting on the oil forces it through tubing to the cooler from which it then passes back to the compressors, for cooling and sealing it as before, whilst the air is passed through a filter as already described. Mounted in the oil line to the compressors is an automatic cut out oil valve which, on the stoppage of the compressors from any cause immediately prevents the further flow of any oil to them.

Further objects of the invention will become apparent from the following description and accompanying drawings, as an example, in which:—

[Price 3s. 6d.]

Price 4s 6d

Figure 1 is an end view of an assembly of four compressors arranged around the power shaft.

Figure 2 is a sectional view of the gear box and two of the compressors on line AA Fig. 1.

Figure 3 is a front view showing the driving gears arranged around the power shaft.

Referring to the Figures 1, 2 and 3, four similarly constructed single stage rotary compressors numbered 1, 2, 3 and 4 are arranged around a power shaft 5, which may be driven in any way preferable, or as by an electric motor or oil engine. Mounted on the splined power shaft 5 is a suitably splined pinion 6. The extended driving shafts 7 of the compressors 1, 2, 3 and 4 are also preferably splined to suit pinions 8, 9, 10 and 11 respectively. These pinions, together with the driving pinion 6 are preferably of the same pitch diameter with the same number of teeth and of suitable diameter so that when threaded on the compressor shafts they can be passed through the bored spigot holes 12 when the compressors are assembled on the gear manifold 13. So that all compressors, whether as direct driven single compressor units, or arranged in multiples as described above, will revolve in the same direction as the engine or motor it is desirable that idler or loose pinions 14 and 15 be introduced, the pinions being splined to their shafts 16 and 17 or as preferred. Hence the same direction of rotation of the power shaft 5 is transferred to the compressors arranged around it.

The inlet ports to the compressors may be connected through piping to a common suction regulating valve whilst the delivery ports of the compressors may also be connected together or arranged in any preferable manner. In the Figures 1 and 2 the four compressors 1, 2, 3 and 4 being similar in all respects, the suction inlets are marked 18 whilst the delivery ports are marked 19. The suction ports 18 are connected by piping 20 to a suction inlet regulating valve 21 whilst the delivery outlets 19 are coupled to non-return delivery valves 22 and 23 and to a common delivery pipe 24 or as preferred.

Should extra cooling of the group compressors be desired they may be enclosed with suitable cleading to form passages and ducts for the air from a fan carried on an extension of the power shaft 5 at its outer end (not shown).

Modifications or adaptations of the gears and the means described may be applied to suit the arrangement or assembly of any preferred number of compressors around a power shaft without departing from the spirit of the invention as set forth in the appended claims, and in some assemblies it may be more advantageous and tend to simplicity to introduce a chain or other drive or a combination of gears and chains as preferred.

What I claim is:—

1. A Rotary Compressor system having a plurality of single stage oil-sealed rotary compressors in multiples of same arranged around and driven by a power shaft through gearing or a chain or other drive wherein the air and sealing oil from the compressors is delivered to an air receiver where they separate, the oil dropping to the bottom of the receiver whilst the oil is forced by the air pressure therein through tubing to a fan cooled multi-passage radiator from which it passes through an automatic cut out oil valve on its way back to seal the compressors.

2. A rotary compressor system having a plurality of single stage oil sealed rotary compressors in multiples of same arranged around and driven by a power shaft through gearing or a chain or other drive wherein the air and sealing oil from the compressors is delivered together to a fan cooled multi-passage radiator from which the mixture is delivered to an air receiver where they separate, the oil dropping to the bottom is then forced by the air pressure therein through tubing to an automatic cut out oil valve and thence to seal the compressors.

3. A rotary compressor system as claimed in Claims 1 or 2 wherein the driving wheel on the power shaft transmits the same direction of rotation through intermediate loose pinions to a plurality of compressors arranged around the power shaft.

4. A rotary compressor system as claimed in the preceding Claims 1 to 3, wherein a fan cooled multi-passage radiator or cooler is used to cool the sealing oil only or the mixed oil and air, as preferred.

5. A rotary compressor system as claimed in the preceding Claims 1 to 4, wherein all oil to the compressors is passed through an automatic cut out oil valve which immediately prevents the further passage of oil to the compressors on their being stopped.

6. A rotary compressor system constructed and arranged to operate substantially as herein described with reference to the accompanying drawings.

T. W. NICHOLS.

PROVISIONAL SPECIFICATION

Improvements in Rotary Compressor Systems

I, THOMAS WINTER NICHOLS, of 23a, Devonshire Road, Bexhill-on-Sea, a British Subject, do hereby declare this invention to be described in the following statement:—

This invention relates to Rotary Air Compressor Systems, or sets primarily, but not necessarily, used in portable plant used in road construction, excavating and mining work, and generally form a self-contained plant or Installation.

These sets or installations comprise an air or water cooled diesel engine or electric motor to drive two stage rotary compressors, an air receiver, wherein the oil is separated from the air compressed, the air being passed through a filter, to remove any oil vapour before passing out to the tools to be worked, such as hammers, drills etc.

The oil drains from the bottom of this receiver, from which the oil is led through a cooler and then back to the compressors continuously, when in operation, for cooling the compressors, by means of a pump. The whole of the installation being mounted on a wheeled chassis for transportation from one working station to another, as required.

On account of the air pressure needed, usually 100 to 125 lbs. per sq. in. to work the air tools at high altitudes and high temperatures, two stage machines are used, often with an intermediate cooler between the low pressure compressor and the high pressure compressor, to get rid of some of the heat generated in compressing the air.

The object of this invention is to simplify these installations by using only a single stage compressor of a preferred output as standard and by multiples of this machine, say two, three, four or more of them assembled around the power driving shaft, a range of outputs is obtained to cover generally the demand of the markets. The single compressor would be driven direct from the engine or motor used, whilst multiples of this machine would be driven through a simple train of gears arranged around the power motor and the gearing could be varied to alter the speed of the compressors so that intermediate outputs would be obtained as preferred. Varying the length of rotor and the body would also vary the output obtained, so that a single set of jigs would be all that is needed to manufacture the full range of compressors for the outputs needed.

Further improvements are envisaged in the methods used for cooling and lubricating the compressor by delivering the air compressed with the oil used for cooling together to the same fan cooled multipassage radiator or cooler, after passing through which, the oil is separated from the compressed air, collected in a receiver and returned back to the compressor, through suitable tubing for the continuous cooling of the machines, as the pressure of the compressed air acting on the oil provides efficient circulation to, and the cooling of, the compressors when in operation.

Should any oil be present in the air in the final receiver, before passing out to the tools to be operated, a simple filter arranged at the outlet from this receiver will collect it.

To obtain efficient and positive circulation of the cooling oil to the compressor or compressors in starting up, even when the air receiver is only at atmospheric pressure, therein, it is proposed to fit a non-return valve close to the main air and oil outlet from the compressor or compressors, the air and oil is then led to, and passed through a specially arranged fan cooled radiator to the oil receiver, where the air deposits practically all the liquid oil it contains on its way through. At the outlet from this oil receiver a further adjustable spring loaded non-return valve is placed to maintain a preferred pressure within the oil receiver, the air and oil cooler and piping back to the non-return valve on the compressor. Suitable piping connects the oil receiver to an automatic non-return oil valve which is suitably placed and arranged, so that it can be connected directly to or by tubing to the space between the underside of the non-return delivery valve and the compressed air port of the stator, so that the air pressure therein can act on a piston which opens the automatic oil valve for the passage of the cooling oil from the oil receiver into the compressor. On the compressor being stopped the non-return valve on the main delivery port from the compressor is immediately seated, whilst the pressurised air in the delivery port of the compressor is also immediately dispersed through the clearances between the rotor and the body, to the inlet port and the oil valve is immediately closed by the pressurised oil from the receiver.

On starting up again, a few revolutions of the compressor generates sufficient pressure to open the oil valve permitting the cooling and lubricating oil to pass into the machine for cooling or lubrication within.

T. W. NICHOLS.

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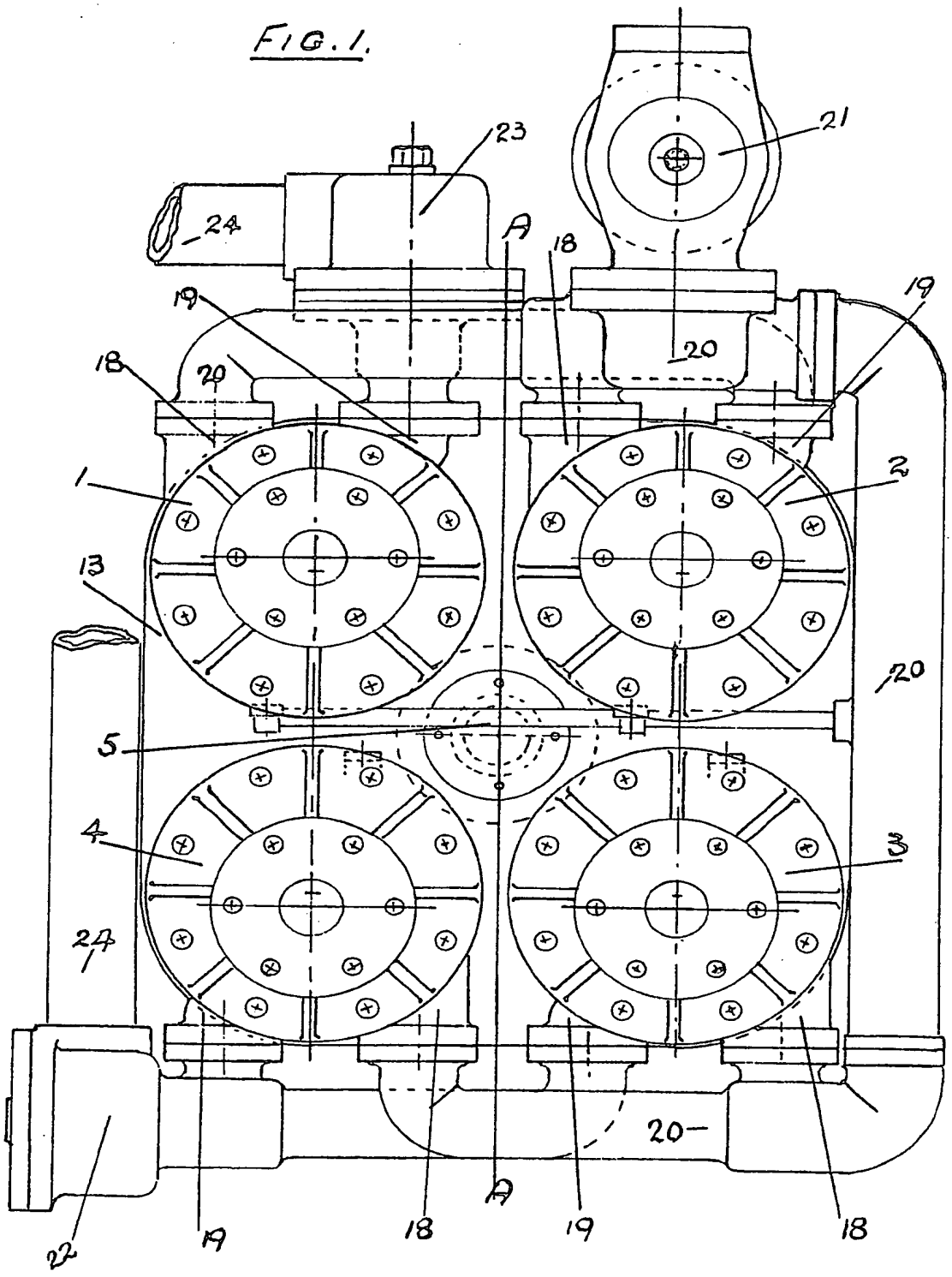
FIG. 1.



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Sheets 1 & 2

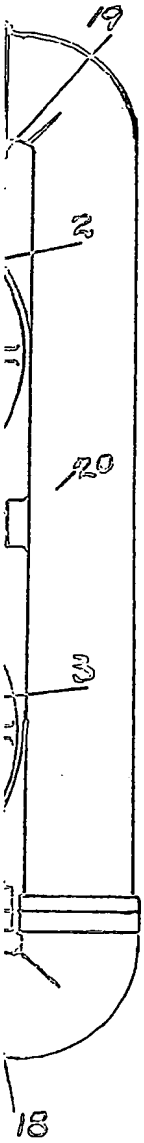
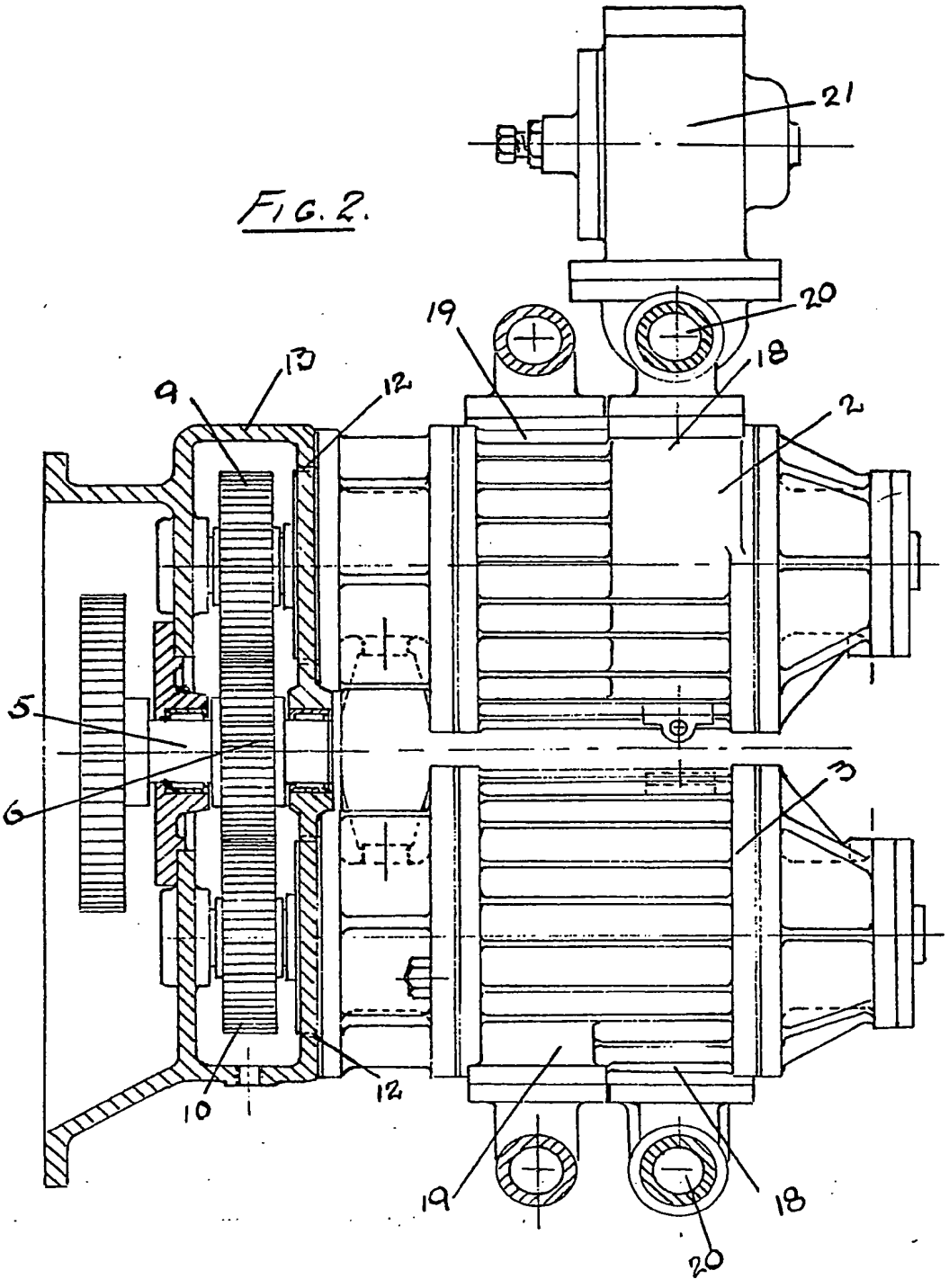


FIG. 2.



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Sheets 1 & 2

FIG. 1.

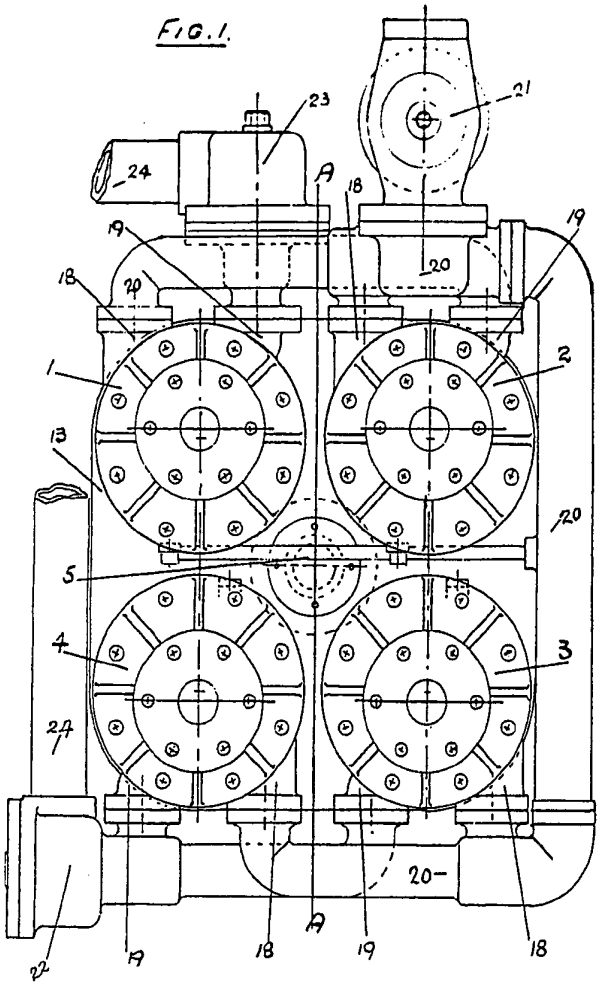
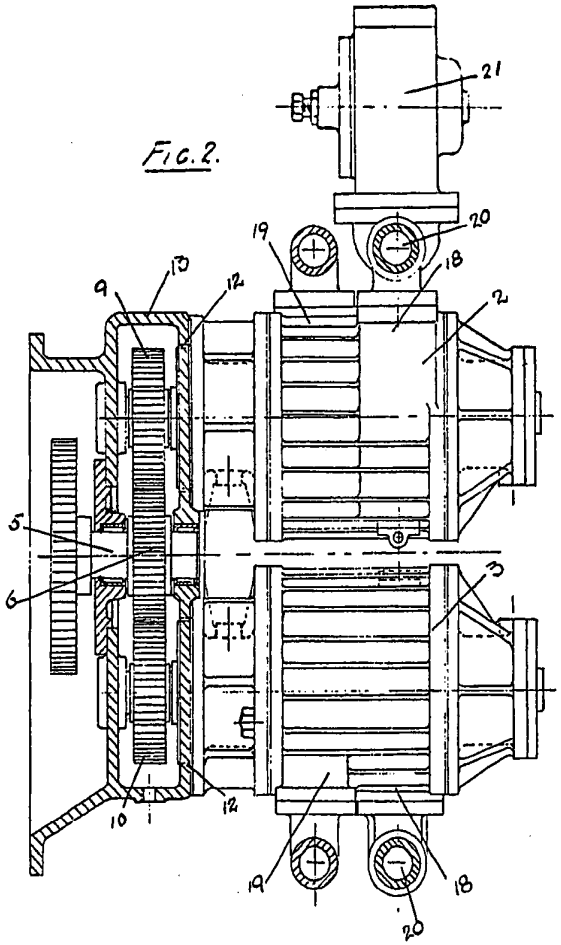


FIG. 2.



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Sheet 3

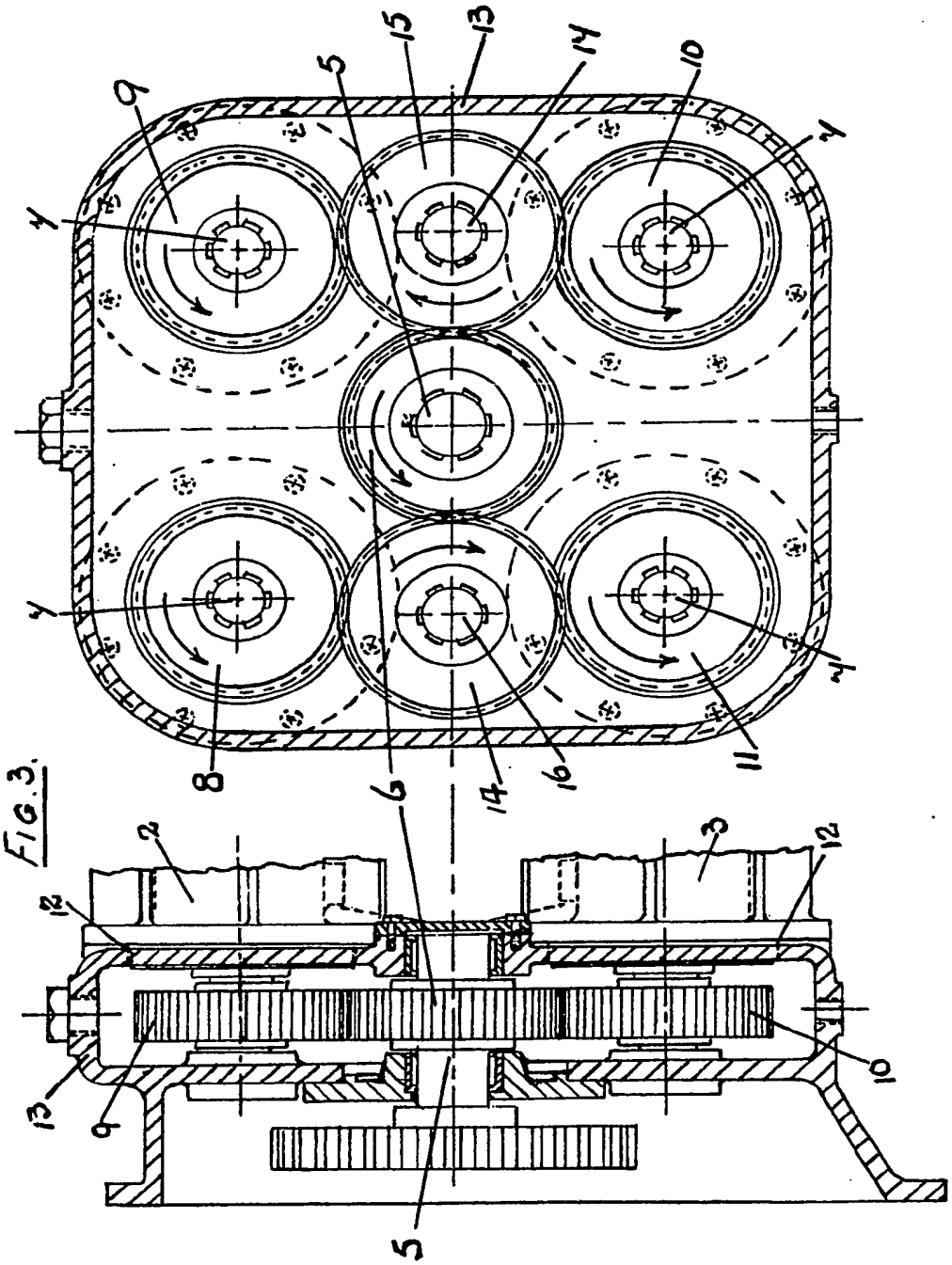

FIG. 3.